

ing child node assigned to one of the data samples in the training dataset; and store the decision tree model in the memory.

[0292] Example 21 includes the computing device of Example 20, wherein: a plurality of labels are assigned to the data samples in the training dataset; and the decision tree model is trained to predict a target variable for unlabeled data samples based on the labels assigned to the data samples in the training dataset.

[0293] Example 22 includes the computing device of Example 21, wherein the processing circuitry is further to: receive an unlabeled data sample, wherein the unlabeled data sample is captured at least partially by the one or more sensors; and perform inference using the decision tree model to predict the target variable for the unlabeled data sample.

[0294] Example 23 includes a method of training a decision tree model, comprising: allocating, in a memory, a tree node array for training the decision tree model, wherein the tree node array comprises a plurality of array elements, wherein a number of array elements in the tree node array is equal to a number of data samples in a training dataset; receiving, via interface circuitry, the training dataset for training the decision tree model, wherein the training dataset comprises a plurality of data samples captured at least partially by one or more sensors; training the decision tree model based on the training dataset, wherein: a root node of the decision tree model is initially assigned to the data samples in the training dataset; the root node is recursively split into a plurality of child nodes based on a plurality of branch conditions identified for the training dataset, wherein each child node is assigned to a corresponding subset of the data samples in the training dataset; and the tree node array is continuously updated during training of the decision tree model to identify the child nodes assigned to the data samples in the training dataset, wherein each array element in the tree node array identifies a corresponding child node assigned to one of the data samples in the training dataset; and storing the decision tree model in the memory.

[0295] Example 24 includes the method of Example 23, wherein: a plurality of labels are assigned to the data samples in the training dataset; and the decision tree model is trained to predict a target variable for unlabeled data samples based on the labels assigned to the data samples in the training dataset.

[0296] Example 25 includes the method of Example 24, further comprising: receiving, via the interface circuitry, an unlabeled data sample, wherein the unlabeled data sample is captured at least partially by the one or more sensors; and performing inference using the decision tree model to predict the target variable for the unlabeled data sample.

[0297] Numerous other changes, substitutions, variations, alterations, and modifications may be ascertained to one skilled in the art and it is intended that the present disclosure encompass all such changes, substitutions, variations, alterations, and modifications as falling within the scope of the appended claims.

What is claimed is:

1. A processing device for training a decision tree model, comprising:

a memory; and

processing circuitry to:

allocate, in the memory, a tree node array for training the decision tree model, wherein the tree node array comprises a plurality of array elements, wherein a

number of array elements in the tree node array is equal to a number of data samples in a training dataset;

obtain the training dataset for training the decision tree model, wherein the training dataset comprises a plurality of data samples captured at least partially by one or more sensors;

train the decision tree model based on the training dataset, wherein:

a root node of the decision tree model is initially assigned to the data samples in the training dataset;

the root node is recursively split into a plurality of child nodes based on a plurality of branch conditions identified for the training dataset, wherein each child node is assigned to a corresponding subset of the data samples in the training dataset; and

the tree node array is continuously updated during training of the decision tree model to identify the child nodes assigned to the data samples in the training dataset, wherein each array element in the tree node array identifies a corresponding child node assigned to one of the data samples in the training dataset; and

store the decision tree model in the memory.

2. The processing device of claim 1, wherein:

a plurality of labels are assigned to the data samples in the training dataset; and

the decision tree model is trained to predict a target variable for unlabeled data samples based on the labels assigned to the data samples in the training dataset.

3. The processing device of claim 2, wherein the processing circuitry is further to:

receive an unlabeled data sample, wherein the unlabeled data sample is captured at least partially by the one or more sensors; and

perform inference using the decision tree model to predict the target variable for the unlabeled data sample.

4. The processing device of claim 2, wherein:

the decision tree model is trained to predict failures for one or more edge devices; and

the target variable is to indicate whether a failure is predicted for the one or more edge devices.

5. The processing device of claim 2, wherein the decision tree model comprises a random forest model, wherein the random forest model is trained to predict the target variable for the unlabeled data samples based on a plurality of decision trees generated from the training dataset.

6. The processing device of claim 2, wherein the child nodes are recursively split into a plurality of leaf nodes until each leaf node is assigned to a corresponding subset of the data samples from the training dataset that are assigned with a same label.

7. The processing device of claim 1, wherein the plurality of branch conditions are identified based on a plurality of Gini indexes computed for a plurality of subsets of the training dataset.

8. The processing device of claim 1, wherein each array element in the tree node array comprises a node number of the corresponding child node assigned to one of the data samples in the training dataset.